influence would not suffice to raise a tide of a quarter-inch at the Sun's surface. But variations of inertia ($m\,d^2$) and of power to produce local oscillations $\left(\frac{m}{d^2}\right)$ may be much more important, in their influence on fluid bodies, than differential tidal variations $\left(\frac{m}{d^3}\right)$. At the very outset of my cosmical investigations (*ante*, ix., 287), I gave a method for estimating the Sun's distance by comparing the atmospheric inertia relatively to the Earth, with the same inertia relatively to the Sun. The remarkable coincidence of the disturbing focus of the Wolfian cycle with the centre of linear oscillation in the planetary system, seems to render it probable that solar explosions and spots are also determined by laws of inertia and local oscillation.

ON BATHMODON, AN EXTINCT GENUS OF UNGULATES.

By Edward D. Cope.

(*Read before the American Philosophical Society, Feb.* 16, 1872.)

The present form embraces some of the largest Perissodactyles, or odd-toed Ungulata, of our Tertiary Strata. It is represented by remains of two species, which include portions of the cranium, with teeth and fragments of jaws; vertebræ, fragments of scapular and pelvic arches and bones of the limbs. The distal end of the tibia is wanting, but that of the fibula indicates an odd-toed animal, and the third trochanter on the exterior ridge of the femur confirms the reference.

There are probably four superior molars, though three only are preserved. Two premolars only remain of the superior species, but the fragment of ramus mandibuli, referred to the same species, exhibits four premolars; from a consideration of the sizes of the superior premolars it is probable that there were four of these also. There are three strong incisors in each premaxillary. No canine tooth is preserved, but the posterior suture of the premaxillary bone is so wide as to point to an equally stout anterior part of the maxillary, fitted to support such a tooth. The dental series increases regularly in size, from before backwards, the last being a little larger than the penultimate. The crowns of the molars exhibit on the outer margin a single, acutely-angled crescent, directed inwards, with a conic lobe alongside of, and anterior to its base, representing a second external crescent. The crescent lobe proper is large and very obliquely directed, so that its external face is almost horizontal. The apex of its companion cone is continuous with its posterior margin, so as to be undistinguishable from it in some cases. The inner crescents are represented by a wide angular ridge, which is at a lower level than the exterior, and is little or not developed on the posterior side of the crown.

Its inner-plane face is horizontal, or even ascending in one species. In the premolar teeth of *B. radians*, the external crescent lobe is single and symmetrical. As the crown contracts inwardly, a second inner crescent lobe has a trihedral form, while in one more anterior, the inner is much reduced. The inferior premolars are all two-rooted, and form an uninterrupted series. The basis of the molar part of the zygomatic arch originates opposite the adjacent parts of the penultimate and last molars. The premaxillary bone is massive, and with but little area for attachment with its fellow in front. The incisor teeth are large, with subcylindric roots, and their alveoli are well separated. In one, perhaps superior, the crown is expanded transversely, with convex cutting edge.

In the *humerus*, the deltoid hook is developed, but is not much elevated above the plane of the head. It originates from an external expansion of the head, which bears a shallow cotylus, separated from the head by a low, curved, subtransverse ridge. The condyles of the humerus do not support any trochlear ridges. An almost perfect femur of *B. radians* is preserved. The third trochanter is not very prominent. The little trochanter is little developed; the great trochanter is large but does not equal the head. The latter is subglobular, and the ligamentous fossa extends to its rim. The distal trochlear surface is prominent, the inner edge more so than the outer. Its articular surface is broadly continuous with those of the condyles; a slight emargination of the outlines only marking the usual constriction on each side. In this it resembles *Cervidæ* and some *Antilopidæ*. The inner condyloid surface is cut off by the emargination in *Toxogen* and *Bos bubalus;* the emarginations are deep, but do not cut off either in *Equus*, *Camelopardalis* and three species of *Bos;* while they are so deep as to cut off both in *Rhinoceros*, 5 sp., *Hippopotamus*, *Bos brachycerus*, *B. sondaicus* and *B. sebynicerus* and in *Catoblepas*.

BATHMODON RADIANS. Cope. Sp. nov.

Represented by portions of several individuals, which indicate an animal varying from the size of the ox to that of the Javan Rhinoceros.

The transverse diameters of all the molars exceed their longitudinal. In the penultimate, which may serve as a type, the superior or outer plane of the inner crescent ridge extends along about .66 of the posterior of the outer crescent. In the last molar this surface is very wide on the posterior and inner side of the external crescent; it then contracts, and expands again on the posterior side, its outer bounding crest reaching to the external margin of the crown.

Besides these points, the molars possess a strong cingulum along the anterior base of the crown, which unites with the surface near the inner proturberance of the latter in the penultimate; in the last molar it reappears, forming a short lobe on the posterior face. The enamel where not worn is slightly rugose.

A posterior premolar has a cingulum on the inner obtuse apex. The crest of the inner crescent, descending on each side of the apex of the

outer, forms a cingulum-like ledge at its base as far as the angle formed by the descent of the apex of the outer crescent. The outline of the corner of this tooth, viewed from above, is narrow cordate, with obtuse apex. The convexity of the outer crescent inwards is very strong, and the base of the crown is externally two-lobed. Enamel striate rugose. In a more anterior premolar (with three roots) there is no internal cingulum, and the crest of the inner crescent is not carried to the external basis of the tooth, and is entirely wanting on the posterior face of the tooth. The external crescent is more vertical and less concave. Outline of crown subtriangular.

The premaxillary bone is elongate, flat, and with a sloping superior face, which rises gently inwards. The bases of the incisors stand obliquely outwards. The inferior surface is flat, and the basis of the broken palatal spine is rather small. An incisor tooth has a transversely diamond-shaped crown, slightly twice concave on the inner face, strongly convex on the outer, with a faint external cingulum near the external angles. Enamel obsoletely striate.

MEASUREMENTS. (NO. 1.)

	M.
Longitudinal diameter last superior molar	.035
Transverse " "	.0455
Longitudinal " penultimate	.032
Transverse " "	.039
Longitudinal " posterior premolar	.024
Transverse " "	.034
Longitudinal " anterior "	.0215
Transverse " " "	.0265
Length premaxillary bone	.082
Transverse width posterior suture	.028
Width premaxillary at middle "	.043
Length basis last two inferior premolars	.057
Transverse diameter edge of mandible at first premolar	.017
Diameter condyles of femur	.104
" heads great trochanter	.130
" head alone	.062
" shaft with third trochanter	.076
Supposed length femur (16.75) inches	.415
Transverse diameter head of tibia	.092
Antero-posterior " internal	.061
" " external	.045
(?) No. 2.	
Longitudinal diameter head of humerus	.138
" " of outer cotylus and tuberosity	.055

The other remains of this animal will be more fully described and the whole figured, shortly. They were discovered by Dr. F. V. Hayden, in tertiary beds of the Wahsatch Group, near Evanston, Utah.

BATHMODON SEMICINCTUS. Cope. Sp. nov.

This species differs from the last in several particulars of dentition. The interior ridge (homologous with the inner crescentic) bounding the middle plane of the superior molars, is not continued on the posterior face of the tooth, but curving inwards joins the outer crest at its apex. The outer crest terminates in a conic tubercle anteriorly on the external face, the rudiment of the anterior crescentic ridge appearing as a low ridge from the side of the posterior one, and rising to a point on the anterior margin of the crown. There is no cingulum round the anterior base of the crown. The latter is as long as wide. The inner crest is reduced to a mere angle, and its posterior face is not basin-shaped but rises to the crest of the inner crescent. The outer face of the latter is sub-horizontal with rising apex, and is concave transversely. Its anterior outer base is narrowed but is less elevated than the posterior.

Measurements.	M.
Length basis crown	.0225
Width "	.022
" exterior crescent	.012
Depth " "	.02

This animal was not more than half the bulk of the last; its size was about that of the *Tapirus terrestris*. The differences in dentition which it presents are so marked as compared with the last species, as to induce me to believe that it will be found on fuller acquaintance to belong to another genus. This may be called *Loxolophodon*. Other remains belonging to these species, or relating to it in size, are contained in Dr. Hayden's collection, but cannot now be referred to with certainty.

From the Wahsatch Beds, near Evanston, Utah.

Especial interest attaches to these fossils from the fact that, they belong to the oldest of the tertiary periods of North America. The Wahsatch Group, according to Dr. Hayden, underlies the Bridger Group, which has yielded so many mammalian species to the researches of Leidy and Marsh. These have been supposed to be Eocene, so that the age and species here described is not later than that. The character presented by the molar teeth are very peculiar, and indicate not only a new genus, but a new family. This has a remote affinity only to the group of *Palæosyops Titanotherium, etc.*

ON TWO NEW ORNITHOSAURIANS FROM KANSAS.

BY EDWARD D. COPE.

(*Read before the American Philosophical Society, March* 1, 1872.)

The species about to be described resemble, in their large proportions, the large pterodactyles of the English chalk and green sand. The specimens at my disposal consist chiefly of portions of the anterior limb, of metacarpals and phalanges. Some of the phalanges of the claw-bearing digits are remarkable for their relatively large diameter, a peculiarity